

NAME: _____

Key

Ch. 9 sections 1 & 2

Confidence intervals and Tests of significance- worksheet #1

- 1) Many middle school students are still bullied, to this day. An SRS of 558 middle school students was taken and they found that 445 of them reported that they had been bullied before.

- a. A previous study found that $\frac{3}{4}$ (75%) of middle school students reported being bullied. Does the sample from above give evidence that this proportion has increased? Use a significance level of 0.05.

$$p = 0.75$$

$$\hat{p} = \frac{445}{558} = 0.797$$

$$n = 558$$

$$\alpha = 0.05$$

$$H_0: p = 0.75$$

$$H_a: p > 0.75$$

$$Z = \frac{0.797 - 0.75}{\sqrt{\frac{(0.75)(0.25)}{558}}} = 2.564$$

$$P(Z > 2.564) = 0.0052$$

We reject H_0 b/c
p-value of 0.0052
 $< \alpha = 0.05$.

We have sufficient
evidence that the
true % of MS students
who are bullied is greater
than 75%.

- b. Since you rejected the claim of 75%, create and interpret a 98% confidence interval for the proportion of middle-schoolers who are bullied.

$$0.797 \pm 2.326 \sqrt{\frac{(0.797)(0.203)}{558}} = (0.7574, 0.8366)$$

We are 98% confident that the true % of
~~MS~~ MS students who are bullied is b/w
75.74% and 83.66%.

- 2) I want to create a 92% confidence interval that has a margin of error of 4%. I know from a previous study that the proportion should be close to 0.57. How big of a sample should I take?

$$0.04 = 1.751 \sqrt{\frac{(0.57)(0.43)}{n}}$$

$$n = 470$$

3) I have the following confidence interval: (0.48, 0.66).

a. What is the sample proportion?

$$\hat{p} = 0.57$$

b. What is the margin of error?

$$m = 0.09$$

4) If we reject our H_0 at $\alpha=0.05$, will we reject it at $\alpha=0.01$? Why or why not?

maybe

5) If we reject our H_0 at $\alpha=0.01$, will we reject it at $\alpha=0.05$? Why or why not?

yes!

6) A study in 2001 found that out of 6853 students surveyed, 726 of them were smokers.

a. Create and interpret a 95% confidence interval for the true proportion of student smokers.

$$\hat{p} = \frac{726}{6853} = 0.106$$

$$0.106 \pm 1.96 \sqrt{\frac{(0.106)(0.894)}{6853}} = (0.0987, 0.1133)$$

We are 95% conf. that the true % of students who are smokers is ~~between~~ btw 9.87% and 11.33%.

b. A study done a year earlier (2000) claimed that the true proportion of student smokers was 11.2%. Is there enough evidence in the sample above to say that the true proportion of student smokers has changed?

$$H_0: p = 0.112$$

$$H_a: p \neq 0.112$$

$$Z = \frac{0.106 - 0.112}{\sqrt{\frac{(0.112)(0.888)}{6853}}} = -1.575$$

$$2 \cdot P(Z > 1.575) = 0.115$$

We fail to reject H_0 b/c
p-value of 0.115 > $\alpha = 0.05$.

We do not have sufficient evidence that the true % of student smokers is not equal to 11.2%.